

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application : 10/599,347
Applicant(s) : Kuiper et al.
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Examiner : Ortiz Criado, Jorge L.
Atty. Docket : NL 041186 [MS-434]
Title: **COMPACT SWITCHABLE OPTICAL ELEMENT**

REPLY BRIEF

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Commissioner for Patents
P.O. Box 1450
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Dear Sir/Madam:

This Reply Brief is being submitted in response to the Examiner's Answer that was mailed on June 11, 2010 in connection with the above-identified patent application.

Claims 1-28 are pending in the application. In the Office Action, Claims 1-8, 15-16 and 19-20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over W002/099527 ("Prins") in view of U.S. Patent No. 4,701,021 ("Le Pesant").

Independent Claim 1 recites

1. A switchable optical unit capable of controlling an external beam of radiation (b) passing through an optically active portion of the unit, wherein the optically active portion comprises a region through which the beam of radiation passes through the switchable optical unit, which unit comprises a chamber,-and an electrically conductive liquid contained in the chamber,

the chamber being provided with an electrode configuration wherein application of a voltage (V), from a voltage control system to electrodes causes movement of the said liquid, characterized in that the electrode configuration comprises:

at least one first electrode fixed to the inner walls of the chamber at the position of the optically active portion,

second electrode means fixed to the inner walls of the chamber at positions outside the optically active portion and a third electrode in contact with the conductive liquid and continuously connected to a first output of a voltage source, a second output of which is connected in a first mode to said at least one first electrode and in a second mode to the second electrode means, and

wherein in a first mode, the electrically conductive liquid fills the chamber inside the optically active portion, and

wherein in a second mode, the electrically conductive liquid fills the chamber outside of the optically active portion.

In the Examiner's Answer, it was argued that the Examiner is not relying on Le Pesant to disclose the electro-wetting principle, where the electrically conductive liquid distribution is switched between modes, instead the Examiner is relying on Prins et al which discloses an arrangement where the beam of radiation in the switchable optical unit in that *wherein in a first mode, the electrically conductive liquid fills the chamber inside the optically active portion, and wherein in a second mode, the electrically conductive liquid fills the chamber outside of the optically active portion.* The Examiner relies on the teachings of Prins et al. at Figs. 3a and 3b, for teaching the first and second modes, respectively. The Examiner further states at page 9 of the Examiner's answer, "*as outlined in the office action rejections what Prins et al. does not expressly disclose is the arrangement or configuration where the beam of radiation passes through the switchable optical unit*". Most importantly, The Examiner states at the last full paragraph of page 9 of the Examiner's answer,

"Where the examiner is relying on Le Pesant is to teach such a configuration where an arrangement in an optical switching unit capable of controlling an

*external beam of radiation passing through an optically active portion of the unit and the beam of radiation passes through the switchable optical unit and that in that wherein in a first mode, a liquid, **which is electrically conductive liquid**, fills the chamber inside the optically active portion, and wherein in a second mode, the liquid fills the chamber outside of the actively active portion. In that a first mode, the liquid fills the chamber inside the optically active portion, and wherein in a second mode, the liquid fills the chamber outside of the optically active portion, having a chamber and a liquid contained in the chamber, the chamber being provided with electrodes configuration wherein **similarly application of a voltage (V), from a voltage control system to electrodes causes movement of said liquid (See Figs. 1-4), filling the chambers inside or outside the optically active portions**".*

Appellants assert that the Examiner admits to relying on le Pesant for teaching **an electrically conductive liquid** and for teaching **the application of a voltage (V), from a voltage control system to electrodes to cause movement of said liquid**. While Appellants readily acknowledge that the Examiner is not relying on Le Pesant to disclose the "*electro-wetting principle*", where the electrically conductive liquid distribution is switched between modes, the Appellants assert that the Examiner fails to appreciate the inconsistency in his assertions by admitting that he relies on Le Pesant for teaching (1) an electrically conductive liquid and (2) the application of a voltage (V), from a voltage control system to electrodes to cause movement of said liquid,. The inconsistency leads to an erroneous conclusion of obviousness for at least the following reasons.

The optical modulator of Le Pesant utilizes **insulating liquids** that do not operate in accordance with the electro-wetting principle. Le Pesant discloses an optical modulator for a light beam using the electrically controlled fluid displacement cells constituted by two parallel transparent plates, defining a capillary space connected to a reservoir containing at least one fluid, as well as to devices for applying electrical fields making it possible to control the displacement of the liquid between the reservoir and the capillary space, comprising at least one cell of a first type, whose transparent plates are positioned perpendicular to the direction of the beam, the capillary space being in the section of the beam and the fluid f2 of the cell being absorbent. See Le Pesant, col. 1, lines 60-67 through col. 2, lines 1-3.

It is particularly emphasized that the **insulating (i.e., non-conductive) liquids** used by Le Pesant are different from the electrically conductive liquids of the invention. Specifically, Le Pesant teaches that Fluids 1f2 and 2f2 are chosen so that their permittivity differs from that of fluid f₁, which can be air. Le Pesant further discloses that the fluid f2 can be chosen from among the hydrocarbons, such as alkanes, containing 5 to 25 carbon atoms, ketones (acetone, cyclohexanone, methyl ethyl ketone) or nitro derivatives (nitrobenzene, nitrotoluene). See Le Pesant, col. 2, lines 45-50. Applicants note that hydrocarbons are by definition insulating. In fact, U.S. Patent 4,681,980 is directed to a method for improving the electrical characteristics of an electrical insulating hydrocarbon suitable for use in oil-filled electrical appliances.

Given the admissions of the Examiner, as cited above, if the method of Le Pesant were substituted into the arrangement of Prins, **the result would be impracticable**. The Examiner admits that Le Pesant is cited for teaching (1) an electrically conductive liquid and (2) the application of a voltage (V), from a voltage control system to electrodes to cause movement of said liquid. That is, the capacitive arrangement of Le Pesant would require thousands of


volts to fill the hollow chamber of Prins. This is due to the voltage having to be applied over the entire cavity. In contrast, the invention only requires a small voltage, on the order of 10V, because it is only applied over a thin insulator, which is independent of the cavity dimensions. The method of Le Pesant is **only operative** for the described arrangement of two parallel plates that are very closely separated, e.g., on the order of 10 micrometers, which is in stark contrast to the method of the invention. It should be understood that this is insufficient to make switchable lenses.

It is well accepted in accordance with MPEP 2143.01, "Suggestion or Motivation to Modify the References", that if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F 2d. 900, 221 USPQ 1125 (Fed. Cir. 1984).

It is further submitted that irrespective of whether the Examiner's asserts that Prins teaches certain elements of claim 1 not taught by Le Pesant, as outlined at page 4 of the Final Office Action, the Appellants rely on the Examiner's assertion that Le Pesant is cited for teaching (1) an electrically conductive liquid and (2) the application of a voltage (V), from a voltage control system to electrodes to cause movement of said liquid, as clearly recited in the Examiner's answer at page 9. As stated above, it is respectfully submitted that the Examiner's assertions at page 9 of the Examiner's answer lead to an erroneous conclusion of obviousness.

Thus, the cited portions of Prins and Le Pesant, individually or in combination, do not disclose or suggest the elements of Appellants Claim 1. Hence claim 1 is allowable. Claims 2-8, 15 and 19-20 depend from claim 1, and are therefore allowable at least by virtue of their dependence from allowable claim 1.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Michael A. Scaturro", is written over a horizontal line.

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